



**Potential Topics for a Bachelor / Master Thesis Work
in the framework of the
System Analysis of an International Planetary Sunshade System to Mitigate Global Warming**

Motivation:

Countering climate change is the most crucial challenge for humanity in the 21st century. One possibility to mitigate global warming without directly modifying the Earth's atmosphere is shading the Earth with one or several thin structures positioned at the Sun-Earth Lagrange Point L1. To achieve a sustainable concept, it is necessary to analyze the technological feasibility of producing these sunshades from space resources. Therefore, technologies for lunar in-situ resource utilization, manufacturing of the sunshades in space, and ways to produce solar cells for powering production facilities and sunshades have to be examined. The trend of in-space manufacturing and international goals for lunar exploration can be utilized for accelerated sunshade development. Many technologies which are required to manufacture satellite structures in space or to operate sustainable lunar exploration are similar to those technologies required for producing sunshades in space. If pursued near-term, the timeframe for technology demonstration is feasible and first sunshades of the IPSS system could be operated by 2060. In order to characterize the entire system with regard to its technological as well as climatic potentials, an overall system modeling is targeted. For this purpose, the various system components must be analyzed, and initial technological parameters must be derived in order to model the individual system components. With such a model the impact of a sunshade mega-constellation in terms of controllability of global warming could be demonstrated and an alignment with other geoengineering measures could be enabled, to provide the crucial time buffer for struggling against climate change.



Potential topics for Bachelor / Master thesis work:

- Analysis of potential MBSE tools for IPSS platform design,
- Analysis of alternative sunshade constellations,
- Lunar In-Situ-Resource Utilization infrastructure / In-Space Manufacturing and Assembly facility for IPSS,
- Simulation of logistical system concept for IPSS,
- Analysis of potential shading patterns,

...and many more! So, if you are interested in participating in a sustainable space-based geoengineering effort to mitigate global warming, send your CV as well as current grade transcript at maheswaran@irs.uni-stuttgart.de. We can then arrange a personal meeting to discuss the specific topic.

Supervisor: Tharshan Maheswaran, M.Sc.

Starting date: TBC

Submission until: TBC

Acknowledgement of receipt:

I hereby confirm that I read and understood the task of the master thesis, the juridical regulations as well as the study- and exam regulations.

Date

Prof. Dr.-Ing. Stefanos Fasoulas
(Responsible Professor)

Date

Signature of the student

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